

REMARKS

Claim 29 was rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Claims 18, 19 and 21 to 28 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 16, 18, 19, 21 to 24 and 29 to 34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taub (U.S. Patent No. 1,727,621) in view of Topham et al. (U.S. Patent No. 5,044,604). Claims 25, 26 and 28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taub in view of Topham et al. and Cummings (U.S. Patent No. 2,439,240). Claim 27 and 35 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taub in view of Topham et al., Cummings and Blume (U.S. Patent 5,345,965).

Claim 29 has been canceled without prejudice. Claims 16, 18, 19 and 21, 22, 26 to 28, 31, 33 and 35 have been amended and new claims 36 to 39 have been added. Support is found for example at paragraphs [0008] to [0010], [0020] and [0025] to [0029].

Reconsideration of the application based on the following remarks is respectfully requested.

35 U.S.C. 112, First Paragraph, Rejection

Claim 29 was rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Claim 29 has been canceled without prejudice.

35 U.S.C. 112, Second Paragraph, Rejection

Claims 18, 19 and 21 to 28 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for being dependent on a canceled claim. Claims 18, 19 and 21, 22 and 26 to 28 have been amended to depend from claim 16 and thus withdrawal of the rejection under 35 U.S.C. 112, second paragraph, is respectfully requested.

35 U.S.C. 103(a) Rejections: Taub and Topham et al.

Claims 16, 18, 19, 21 to 24 and 29 to 34 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taub in view of Topham et al.

Taub discloses a poppet valve that includes a stem 48 having a reduced portion 50 which is threaded to receive a valve head 52. (Taub, page 2, lines 15 to 20; Fig. 3). An end of valve head 52 is peened over at 54 for fixing the head 52 securely to the stem. (Id.). “The head 52 is formed on its stem-connected side with an annular ridge 56 having a frusto-conical outer surface fitting within the larger encl of a tapered shroud 58, the opposite end of the shroud fitting the reduced portion 50 of the valve stem and abutting against the shoulder 51.” (Id., page 2, lines 26 to 32; Fig. 3).

Topham et al. discloses valve for a water tap that includes a plastic valve plug 7 connected to a valve stem 6. (Topham et al., col. 4, lines 23 to 24). An inner portion 20 of valve plug 7 includes a number of radial reinforcing ribs 25 connecting a sleeve 24 and a shell 23. (Id., col. 7, lines 14 to 20).

Claim 16, as amended, recites “[a] lightweight combustion engine valve comprising:
a metallic valve stem including a valve stem end face;
a hollow valve cone having a region of greater diameter; and
a metallic valve disk, the valve cone and the valve disk together forming a hollow space,
the valve disk having a flat side facing the hollow space supporting a gripping receiver, the
gripping receiver gripping an end portion of the valve stem and the valve stem end face resting
against the flat side, the valve disk having a recess defined therein that has an edge region
including an edge step for supporting the valve cone;

wherein the gripping receiver is formed by reinforcing ribs on the valve disk, each of the
reinforcing ribs including an end face facing a center of the valve disk center and an upper face
supporting an inner wall of the valve cone, each end face forming a separate wall portion, the
wall portions together gripping an outer circumference of the valve stem, the region of greater
diameter of the valve cone engaging in the recess of the valve disk, the valve cone being welded
together with the valve stem and being welded together with the valve disk in the recess.”

Claims 18, 19, 21 to 24, 29, 30 and 34 are dependent on claim 16.

It is respectfully submitted that neither Taub nor Topham et al., alone or in combination,
discloses “each of the reinforcing ribs including an end face facing a center of the valve disk

center and an upper face supporting an inner wall of the valve cone, each end face forming a separate wall portion, the wall portions together gripping an outer circumference of the valve stem” as recited in claim 16. In Topham et al., an inner portion of a plastic valve plug 7 includes a number of radial reinforcing ribs 25 that connect a sleeve 24 and a shell 23 “[i]n order to reduce the weight and cost of the inner portion 20.” (Col. 7, lines 14 to 20). Radial reinforcing ribs 25 of Topham et al. do not each include an end face forming a separate wall portion gripping an outer circumference of valve stem 6. Ribs 25 of Topham et al. clearly do not grip valve stem 6. Sleeve 24, which is clearly distinct from ribs 25, grips valve stem 6. Ribs 25 are merely used to connect the semi-spherically shaped shell 23 to sleeve 24 in a manner that reduces the weight and cost of inner portion 20. The assertion that ribs 25 grip valve stem 6 completely ignores the specific teaching at col. 7, lines 14 to 20 of Topham et al. Furthermore, radial reinforcing ribs 25 of Topham et al. do not include “an upper face supporting an inner wall of the valve cone” as recited in claim 16.

Furthermore, it is respectfully submitted that one of skill in the art would not have had any reason to have modified the poppet valve of Taub in view of the water tap valve of Topham et al. to include the “reinforcing ribs” recited in claim 16. The valve in Topham et al. is preferably made of plastic and is clearly for a water tap (see e.g., Fig. 1). One of skill in the art of combustion engine valves would not have looked to the plastic molded water tap valve of Topham et al. when designing a lightweight combustion engine valve. The valve of Topham et al. would not be suitable for use in the extreme pressures and temperatures of a combustion engine and it would not have been obvious for one of skill in the art to have looked to this valve when designing a lightweight combustion engine valve.

It is also respectfully submitted that the Examiner’s reasoning for modifying the poppet valve of Taub in view of the water tap valve of Topham et al. is conclusory and based on hindsight bias. At page 5 of the Final Office Action dated March 2, 2010, the Examiner states “it would have been obvious to one of ordinary skill in the art to incorporate, in Taub, a plurality of radially extending reinforcing ribs as a gripping receiver on a valve disk, as taught by Topham et al., so as to prevent the valve stem from deflecting horizontally with respect to the valve disk while maintaining a light weight and low operating temperature.” In all of the embodiments of

Taub, the valve stem is either formed integrally with the valve head or the valve stem passed through the valve head. In view of this, it is respectfully submitted that the valve stems would not have deflected horizontally with respect to the valve disks and thus the Examiner's reasoning for modifying Taub in view of Topham et al. is not supporting by sufficient reasoning and is conclusory. Furthermore, it is respectfully submitted that one of skill in the art, in view of the teaching of using radial reinforcing ribs 25 to connect a sleeve 24 and a semi-spherically shaped shell 23 “[i]n order to reduce the weight and cost of the inner portion 20,” would not have modified any of the flat valve heads of Taub to include the “reinforcing ribs” of claim 16.

Similarly, it is also respectfully submitted that one of skill in the art would not have modified Taub in view of Topham et al. to include a “valve disk having a flat side facing the hollow space and a gripping receiver, the flat side supporting the gripping receiver” as recited in claim 16. Topham et al. involves using radial reinforcing ribs 25 to connect semi-spherically shaped shell 23, which is curved upward towards a plane parallel to with sleeve 24 and includes arcuate grooves 12 and radial ridges 17, to the sleeve 24 and does not teach a flat side of a valve disk supporting radial reinforcing ribs 25 or provide any reason to modify any of the flat valve heads of Topham et al. to include the claimed “gripping receiver” on the flat side of the valve heads of Taub that faces the respective shroud.

Based on the foregoing, withdrawal of the rejection under 35 U.S.C. 102(b) of claims 16 to 24, 29, 30, 33 and 34 is respectfully requested.

Independent Claim 31

Claim 31 recites “[a] method for manufacturing a lightweight combustion engine valve comprising:

producing a first one-piece component forming a metallic valve disk having a recess defined therein that has an edge region including an edge step, the valve disk including a gripping receiver and a flat side, the flat side supporting the gripping receiver, the gripping receiver being formed by a plurality of reinforcing ribs by casting, forming and/or powder metallurgy method, each of the reinforcing ribs including an end face facing a center of the valve disk center and forming a separate wall portion;

producing a second one-piece component forming a metallic valve stem having a valve stem end face and an outer circumference, the gripping receiver being for the valve stem;

producing a third component forming a hollow valve cone having an end of greater diameter;

connecting the first and second components by forcing valve stem into the gripping receiver so each of the wall portions contacts the outer circumference of the valve stem and the valve stem end face contacts the flat side of the valve disk, and

pushing the third component onto the second component after the valve stem is forced into the gripping receiver and connecting the third component to the first and second components by engaging the end of greater diameter of the hollow valve cone in the recess of the valve disk and welding the valve disk in the recess and welding the valve stem to the hollow valve cone.”

Claim 32 is dependent on claim 31.

It is respectfully submitted that neither Taub nor Topham et al., alone or in combination, discloses “pushing the third component onto the second component after the valve stem is forced into the gripping receiver and connecting the third component to the first and second components by engaging the end of greater diameter of the hollow valve cone in the recess of the valve disk and welding the valve disk in the recess and welding the valve stem to the hollow valve cone” as recited in claim 31. Taub does not disclose pushing any of the shrouds of Taub onto a valve stems after the valve stem is connected to the valve head and Topham et al. does not provide any reason for one of skill in the art to modify Taub to include the “pushing” step of claim 31.

Also, as similarly discussing above, it is respectfully submitted that neither Taub nor Topham et al., alone or in combination, discloses the step of claim 31 of “connecting the first and second components by forcing valve stem into the gripping receiver so each of the wall portions contacts the outer circumference of the valve stem and the valve stem end face contacts the flat side of the valve disk” as recited in claim 31. Taub does not include reinforcing ribs having end faces that form separate wall portions and does not provide any reason for one of skill in the art to modify Topham et al. to include the “connecting” step of claim 31.

Based on the foregoing, withdrawal of the rejection under 35 U.S.C. 102(b) of claims 31

and 32 is respectfully requested.

Independent Claim 33

Claim 33, as amended, recites “[a] lightweight combustion engine valve comprising:
a metallic valve stem;
a hollow valve cone having a region of greater diameter; and
a metallic valve disk, the valve cone and the valve disk together forming a hollow space,
the valve disk having a gripping receiver for gripping the valve stem formed by a plurality of
reinforcing ribs on the valve disk extending radially inward from a circumference of the disk to
grip an outer circumference of the valve stem and a recess defined therein that has an edge region
including an edge step for supporting the valve cone, each of the reinforcing ribs including an
end face facing a center of the valve disk center and forming a wall portion gripping an outer
circumference of the valve stem, the region of greater diameter of the valve cone engaging in the
recess of the valve disk, the valve cone being welded together with the valve stem and being
welded together with the valve disk in the recess.”

It is respectfully submitted that neither Taub nor Topham et al., alone or in combination,
discloses “each of the reinforcing ribs including an end face facing a center of the valve disk
center and forming a wall portion gripping an outer circumference of the valve stem” as recited
in claim 33. Taub does not include reinforcing ribs. Topham et al. discloses a number of radial
reinforcing ribs 25 connecting a sleeve 24 and a shell 23. Ribs 25 of Topham et al. clearly do not
grip valve stem 6. Sleeve 24, which is clearly distinct from ribs 25, grips valve stem 6. Ribs 25
are merely used to connect the semi-spherically shaped shell 23 to sleeve 24 in a manner that
reduces the weight and cost of inner portin 20. The assertion that ribs 25 grip valve stem 6
completely ignores the specific teaching at col. 7, lines 14 to 20 of Topham et al.

Furthermore, it is respectfully submitted that one of skill in the art would not have had
any reason to have modified the combustion engine valve of Taub in view of the water tap valve
of Topham et al. to include the “reinforcing ribs” recited in claim 33. The valve in Topham et al.
is preferably made of plastic and is clearly for a water tap (see e.g., Fig. 1). One of skill in the art
of combustion engine valves would not have looked to the plastic molded water tap valve of

Topham et al. when designing a lightweight combustion engine valve. The valve of Topham et al. would not be suitable for use in the extreme pressures and temperatures of a combustion engine and it would not have been obvious for one of skill in the art to have modified the combustion engine valve of Taub in view of the valve of Topham et al.

It is also respectfully submitted that the Examiner's reasoning for modifying the poppet valve of Taub in view of the water tap valve of Topham et al. is based on conclusory and based on hindsight bias. At page 5 of the Final Office Action dated March 2, 2010, the Examiner states "it would have been obvious to one of ordinary skill in the art to incorporate, in Taub, a plurality of radially extending reinforcing ribs as a gripping receiver on a valve disk, as taught by Topham et al., so as to prevent the valve stem from deflecting horizontally with respect to the valve disk while maintaining a light weight and low operating temperature." In all of the embodiments of Taub, the valve stem is either formed integrally with the valve head or the valve stem passed through the valve head. In view of this, it is respectfully submitted that the valve stems would not have deflected horizontally with the valve disks and thus the Examiner's reasoning for modifying Taub in view of Topham et al. is not supporting by sufficient reasoning and is conclusory. Furthermore, Topham et al. merely involves using radial reinforcing ribs 25 to connect semi-spherically shaped shell 23, which is curved upward towards a plane parallel to with sleeve 24 and includes arcuate grooves 12 and radial ridges 17, to the sleeve 24 and does not provide any reason to modify any of the flat valve heads of Topham et al. to include the claimed "gripping receiver" on the flat side of the valve heads of Taub that faces the respective shroud.

Based on the foregoing, withdrawal of the rejection under 35 U.S.C. 103(a) of claim 33 is respectfully requested.

35 U.S.C. 103(a) Rejections: Taub, Topham et al. and Cummings

Claims 25, 26 and 28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taub in view of Topham et al. and Cummings (U.S. Patent No. 2,439,240).

Claims 25, 26 and 28 are dependent on claim 16. In view of the arguments with respect to claim 16, withdrawal of the rejection under 35 U.S.C. 103(a) of claims 25, 26 and 28 is respectfully requested.

35 U.S.C. 103(a) Rejections: Taub, Topham et al., Cummings and Blume

Claim 27 was rejected under 35 U.S.C. 103(a) as being unpatentable over Taub in view of Topham et al., Cummings and Blume (U.S. Patent 5,345,965).

Claim 27 is dependent on claim 16. In view of the above arguments with respect to claim 16, withdrawal of the rejection under 35 U.S.C. 103(a) of claim 27 is respectfully requested.

New Claims

New dependent claims 36 to 39 have been added. Support is found for example at paragraphs [0008] to [0010], [0020] and [0025] to [0029]. New dependent claims 36 to 39 are allowable for at least the same reasons discussed above with respect to independent claims 16 and 31.

CONCLUSION

The present application is respectfully submitted as being in condition for allowance and applicants respectfully request such action.

Respectfully submitted,
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